

# **Ag Metal Fabrication Technology**

## **18404**

### **Rationale Statement:**

The Ag Metal Fabrication Technology course prepares students for careers in the metal fabrication industry in the Power, Structural & Technical Systems Career Pathway. Classroom and laboratory content will be enhanced by utilizing appropriate equipment and technology. Geometry, physical science, physics, English and human relations skills will be reinforced in the course. Work-based learning opportunities appropriate for this course are school-based enterprises and field trips. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conference and career development events. Each student will be expected to complete a Supervised Agricultural Experience Program/Internship.

### **Suggested grade level: 10-12**

### **Topics covered:**

- Careers in metal fabrication
- Welding preparation and safety procedures
- Properties of materials
- Project design and construction procedures
- Welding fundamentals
- Shielded Metal Arc Welding (SMAW)
- Metal Inert Gas (MIG) welding, also known as Gas Metal Arc Welding (GMAW)
- Oxy-acetylene, brazing and torch cutting
- Plasma cutting
- Tungsten Inert Gas (TIG) welding, also known as Gas Tungsten Arc Welding (GTAW)

**Indicator #1: Demonstrate the basics of metal fabrication.**

<b>Bloom's Taxonomy Level</b>	<b>Standard and Examples</b>
Understanding	<p><b>AMF1.1 Discuss metal fabrication, related technologies and careers.</b></p> <p>Examples:</p> <ul style="list-style-type: none"><li>• Describe the importance of metal fabrication.</li><li>• Report on careers in metal fabrication.</li><li>• Describe the impact of technology in the metal fabrication industry.</li><li>• Identify different types of metal (e.g. stainless steel, aluminum).</li></ul>
Applying	<p><b>AMF1.2 Prepare different types of metal for welding.</b></p> <p>Examples:</p> <ul style="list-style-type: none"><li>• Square materials.</li><li>• Measure and mark metals using chalk, marking paint, etc.</li><li>• Cut metal with hand and power tools.</li><li>• Bend, shape, file and grind metals.</li><li>• Drill holes with power tools.</li></ul>
Applying	<p><b>AMF1.3 Create plans for project construction.</b></p> <p>Examples:</p> <ul style="list-style-type: none"><li>• Estimate cost of construction materials.</li><li>• Develop a bill of materials, cutting list and welding procedures.</li><li>• Interpret welding symbols and their meanings.</li><li>• Use current computerized technology to develop plans and sketches.</li><li>• Interpret symbols and drawing techniques used to develop plans and sketches for a shop project.</li><li>• Use scale measurement and dimension to develop plans and sketches for a shop project.</li></ul>

**Indicator #2: Demonstrate the principles of Shielded Metal Arc Welding (SMAW) and the correct operation of SMAW equipment.**

<b>Bloom's Taxonomy Level</b>	<b>Standard and Examples</b>
Applying	<p><b>AMF2.1 Perform Shielded Metal Arc Welding (SMAW).</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Use proper welding clothing and safety equipment.</li> <li>• Dramatize possible hazardous welding situations.</li> <li>• Demonstrate proper safety procedures and operation of equipment.</li> <li>• Demonstrate steps of the arc welding process.</li> <li>• Illustrate the difference between A/C vs. D/C.</li> <li>• Choose electrodes for their proper applications.</li> <li>• Illustrate the main welding positions.</li> <li>• Demonstrate a correct welding arc.</li> <li>• Demonstrate correct weld joints.</li> </ul>

**Indicator #3: Demonstrate the principles of Metal Inert Gas (MIG) welding, also known as Gas Metal Arc Welding (GMAW), and the correct operation of MIG equipment.**

<b>Bloom's Taxonomy Level</b>	<b>Standard and Examples</b>
Applying	<p><b>AMF3.1 Perform metal inert gas (MIG) welding.</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Use proper welding clothing and safety equipment.</li> <li>• Dramatize possible hazardous welding situations.</li> <li>• Demonstrate proper safety procedures and operation of equipment.</li> <li>• Compare the MIG welding process to Shielded Metal Arc.</li> <li>• Demonstrate proper MIG machine settings.</li> <li>• Demonstrate a correct welding arc.</li> <li>• Demonstrate correct weld joints.</li> </ul>

**Indicator #4: Demonstrate the principles of oxyacetylene welding and the correct operation of oxyacetylene equipment.**

<b>Bloom's Taxonomy Level</b>	<b>Standard and Examples</b>
Applying	<p><b>AMF4.1 Perform oxyacetylene welding and brazing.</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Use proper welding clothing and safety equipment.</li> <li>• Dramatize possible hazardous welding situations.</li> <li>• Demonstrate three types of flames.</li> <li>• Demonstrate proper safety procedures and operation of equipment.</li> <li>• Illustrate oxyacetylene equipment, parts and correct settings.</li> <li>• Demonstrate safe startup and shutdown of the oxyacetylene equipment.</li> <li>• Perform correct techniques for brazing, heating and cutting metal.</li> <li>• Demonstrate correct weld joints.</li> </ul>

**Indicator #5: Demonstrate the principles of plasma cutting and the correct operation of plasma cutting equipment.**

<b>Bloom's Taxonomy Level</b>	<b>Standard and Examples</b>
Applying	<p><b>AMF5.1 Perform plasma cutting.</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Use proper welding clothing and safety equipment.</li> <li>• Demonstrate correct operation procedure of plasma equipment.</li> <li>• Illustrate the parts and functions of plasma cutting equipment.</li> <li>• Demonstrate correct setup of equipment and settings.</li> <li>• Demonstrate the correct procedure for cutting different metal thickness.</li> </ul>

**Indicator #6: Demonstrate principles of specialized welding equipment through Tungsten Inert Gas (TIG) welding, also known as Gas Tungsten Arc Welding (GTAW), and the correct operation of this specialized equipment.**

<b>Bloom's Taxonomy Level</b>	<b>Standard and Examples</b>
Applying	<p><b>AMF 6.1 Perform tungsten inert gas (TIG) welding.</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Describe TIG operating principles and procedures.</li> <li>• Compare TIG advantages and disadvantages.</li> <li>• Distinguish different Tungsten rods and their correct applications.</li> <li>• Explain the use of the TIG shielding gases.</li> <li>• Demonstrate general TIG process.</li> <li>• Perform correct setup of equipment.</li> <li>• Perform correct preparation of Tungsten Rod.</li> <li>• Demonstrate correct weld joints.</li> </ul>